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ON THE IMPORTANCE OF DENTAL KNOWLEDGE TO THE MEDICAL PROFESSION.

THE animal, vegetable, and mineral kingdoms have been thoroughly investigated in search of remedial agents. A vast amount of skill and ingenuity has been expended in producing instruments and mechanical appliances to facilitate the operations of the surgeon, and to relieve the various imperfections and deformities to which the human frame is subject. Amid this general progress, one important branch of medical mechanics, namely, dentistry, has hitherto been almost entirely neglected by the medical practitioner. A little consideration will demonstrate its great importance in the treatment of many serious diseases, and certainly no branch of knowledge, the possession of which gives the physician increased means of alleviating human suffering and prolonging human life can be considered derogatory. In such a subject as dentistry, it is not necessary for the medical practitioner to study all the mechanical minutiæ, but he ought to have such a knowledge as will enable him to prescribe the necessary remedial measures for his patient, and to judge whether the appliances provided accomplish properly the objects for which they were ordered.

Healthy digestion cannot take place unless the preliminary stage of mastication be properly gone through, and this requires the teeth, the organs provided by nature for that purpose, to be in a sound condition. Surely, then, no medical education can be considered complete, in which the defects of so important a function, and the means required for their removal, are left unstudied.

The importance of this subject has been long admitted by our leading men. Dr. Watson, in his Lectures on the Practice of Physic, vol. 2, 4th edition, page 467, says: "In order that digestion may be perfect and easy, it is requisite that the food be in a state of minute division. This object is attained by mastication. In like manner, the chemist first triturates a solid when he desires to facilitate its solution in the proper menstruum. A weak, dyspeptic stomach acts slowly, or not at all, on solid lumps and tough masses of food. The delayed morsels undergo spontaneous changes, promoted by the mere warmth and moisture of the stomach: gases are extricated, acids are formed, perhaps the half-digested mass is at length expelled by vomiting; or it passes undissolved into the duodenum, and becomes a source of irritation and disturbance during the whole of its journey through the intestines. Here then we have one common cause of dyspepsia; and an easy and obvious preventive. Dyspeptic persons should not eat in a hurry, as busy men, and studious and solitary men, are apt to eat. They are to be cautioned against bolting their food; *it must be well ground in the mill that nature has provided for that purpose. I am not at all sure that the increased longevity of modern generations is not in some degree attributable to the capability of chewing their food, which the skill of the dentist prolongs to persons far advanced in life.*"

A constant relation subsists in all animals between the nature of the food, the shape and structure of the teeth, and the articulation of the jaw; so that, as Cuvier demonstrated, one of these elements being known, the others may be more or less accurately inferred. Todd and Bowman say in their Physiology of Man, "an obvious use of the saliva is to aid in reducing the food to a pultaceous form in which it is more easily swallowed. During the movements of mastication it is intimately mingled with the whole mass, and may thus very probably mechanically enable the gastric juice to penetrate more quickly to every part on its arrival in the stomach. The experiments of Leuchs have proved that saliva has the power of converting starch into sugar, a change similar to what occurs in the stomach; and Spallanzani observed, that aliments enclosed in perforated tubes and introduced into the stomach of living animals were earlier digested when previously mixed with saliva than with water."

Hundreds of cases, if sought for, in the experience of every practitioner, would show a careful examiner that the evils now defying all remedies for their alleviation commenced in imperfect digestion, and that this dated from the loss of teeth, or what is quite as bad, from the time when they had become useless by being in a decayed and painful state.

Few people bite on both sides of the mouth; few mouths are in a state to allow it at all times, and teeth out of use are sure, sooner or later, to be lost. The loss of teeth in one jaw throws out of employment those that antagonize them in the other, they become lengthened, raised in their socket, the alveoli shortened by the deposition of bone, and eventually the teeth so situated are loosened and lost. This would not have been the case had the lost teeth been replaced. If a single molar is lost, this will not be the result, as the teeth of the two jaws do not stand directly over each other, but one of either jaw always bites upon two teeth of the other jaw, as though nature, foreseeing the defect that must arise to the remaining teeth from the loss of their antagonists had endeavoured to provide against this contingency as long as possible by not allowing any one tooth to be out of use until two of the other jaw were lost. Few but dentists have noticed this every-day occurrence, and yet there are not ten per cent. of mouths over the age of thirty which will not shew it in a marked manner. Sometimes both sides of the mouth are disabled by the loss of four or five teeth because they happen not to be those meeting each other; this compels the food to be chewed as best it can be by the front teeth, which are not intended for that office; and a small amount of imperfect mastication is bought by the sacrifice of those most useful and ornamental features. They in time become injured, probably ground down, or more commonly forced out of place, and then the evil cause is detected when it is too late to afford relief. Whereas a very small arrangement of artificial matter, properly provided in due time, would have saved the whole evil to the mouth, and thereby probably have prevented an amount of chronic derangement of the other digestive organs and saved the health of the patient. In the elephant and some other Pachydermata, when only one, or at the most two, grinding teeth appear at one time on each side of either jaw, the shedding of two teeth might disable the whole masticating apparatus, if the teeth were placed like ours, the milk teeth over the permanent, or nearly so, and dislodged by the absorption of their roots, this necessitating an interval between the shedding of the milk tooth and the coming into use of the permanent one. Nature foreseeing the evil consequence which would thus arise to these animals, has altered her course, and made the new tooth replace the old one from behind; thus the old is worn down to a stump, and is present till the work falling on its successor, renders the loss of the remnants of the old tooth unimportant.

What a beautiful lesson have we here! nature teaching us the importance of rectifying the effects of civilization, and our own neglect, which have rendered her otherwise perfect arrangement defective. She has given us, moreover, ingenuity to overcome the evil. The remaining teeth may be benefitted and preserved by artificial ones. They may, too, be injured by badly made ones pulling, pressing, or rotting them, but this is quite unnecessary, and should never occur, the days for clasping artificial teeth immovably to sound natural ones are gone; it might have been excusable in the last century to tie them together with wire or silk ligatures, but except as a temporary arrangement, it would now never be thought of. It may be asked, do artificial teeth then never injure the remaining ones? if well placed, the answer is easy, no—unless allowed to do so by the unpardonable carelessness of the wearer. A carious tooth will destroy its neighbour,—how? by contagion? no, but by filth or by cotton-wool put into it with nostrums to keep out the cold, a most fertile agent in procuring work for the dentist. The teeth may be looked upon as gelatinous bodies calcified, their calcareous matter is soluble in the acids generated by decaying substances, to wit, the epithelial cells thrown off from the mucous membrane of the mouth, and the juices of the food left stagnant in the cavities of carious teeth, or imbibed by the cotton-wool placed in them to relieve pain. The cotton-wool, or fragments of food, thus left undisturbed in a decayed tooth, and no less the dirty surfaces of artificial teeth, allowed to remain for weeks, months, nay, in truth, alas! years, unwashed, filthy, festering, a mass of corruption, are sufficient to destroy the health of the strongest constitutions; but allowed to remain because the medical attendant's attention has not been called to this state of things in the mouth, or because he considers these matters out of his province. The food and drink of his patient are strictly regulated, but he never looks to the mass of corruption through which, and over which, and mixed with which, often times that food and drink passes into an already weakened stomach. These matters are more in his department than he has been accustomed to think, and it is in them he may often, if he will, find the source of many a malady, the clue to the cure of which has eluded his most searching and careful observation.

All artificial teeth should, as a rule, be easy of removal by the patient, and be removed, washed thoroughly with a brush and powder in every part, once in twenty-four hours. The mouth should be thoroughly cleansed, the remaining teeth brushed with chalk ; a wash of carbonate of soda, or other alkali, used after the brushing to both the mouth and the artificial teeth, to neutralize any acidity, and thus the teeth may be worn for twenty years without the least injury to the remaining ones. If this treatment were constantly followed with our own teeth, there would be little necessity for this paper. Neglect is the chief source of caries in teeth, and caries is the great enemy through whose agency they are lost. All dental pathologists ascribe caries to acid in some form, either generated external to or by the death of the tooth structures, and all propose for its cure exclusion of external influences. It is a constant occurrence to meet with teeth that have ceased to decay because the decaying surface has assumed such a shape and position that the tongue or food can lick or rub it smooth by their natural passage over it. And so it will be with all surfaces touched properly by artificial teeth, if they are kept clean.

During the last ten years this department of mechanical art has undergone very great changes, and has developed itself almost more satisfactorily than any other like contrivances applied to the relief of the suffering patient. The great improvements effected have led to a greatly increased demand for such help, and as increased demand for any article is sure to facilitate its production, improve its quality, and regulate its cost: so with artificial teeth, their increased usefulness has made them, one may say, necessary to human comfort, health, and longevity, and placed them in the list of those appliances prescribed by the medical man to facilitate the recovery and increase the comfort of his patient.

Little good can be expected to accrue to the sufferer from the prescription of his medical adviser if the latter be ignorant of the nature and quality of the drugs prescribed. The truss he orders may be of inestimable benefit and comfort if it be well adapted to the particular case to which it is applied, but if not it may only increase the mischief it is designed to alleviate. The effect of the drug or the truss the medical practitioner would discover immediately, because his previous laborious education has taught him to understand what these things are capable of doing, how they should act, and what harm may come from their defects or misapplication. He changes the drugs that are not producing the expected result, and discontinues the truss, which is not benefiting his case. Why should not artificial teeth be as well known, and as much under control? They are intended to perform artificially a certain operation, which is absolutely necessary to health, and their assistance is called for because the organs originally provided by nature to effect this necessary process are no longer able to perform their allotted task. The patient's good is the doctor's constant thought, and unhesitatingly would he order recourse to artificial mastication were he sure that the apparatus provided would produce the desired effect, without subjecting his suffering patient to increased discomfort, with, in many cases, little hope of ultimate advantage. Let him but acquire as much information on this matter as he already possesses about trusses, splints, and bandages, and no such failures will arise to discourage him, and one more useful auxiliary will be added to his healing power.

Before these extraneous substances can be placed in the mouth, with good hope of success, the parts on which they are to rest must be in a sound state, capable of bearing the pressure exerted in their use. If the best horse has a loose stone in his hoof he cannot run, so the best artificial teeth in the world would be useless if the force of biting caused them to press on a loose stump. A sound stump, on the contrary, might give firmness, and assist the operation ; again, a sore place, an ulcer, or an abscess, is not rendered more easy by pressure. First, then, it follows that these things must not exist, or if they do, they must be removed, and the patient must be fully enlightened on the subject, and, if living at any distance from the dentist, this preparation should be accomplished by the medical attendant beforehand.

Directions in such a matter are quite unnecessary, as no dentist knows better how to put a mouth in order than the medical man himself, except in the matter of teeth to be plugged ; and as a rule, all teeth slightly carious, firmly set in healthy sockets, can be retained, and should be left for the dentist ; and also good, healthy stumps ; none need be extracted for irregularity, unless the mouth, independent of artificial substitutes, would be improved by removing them.

In spongy, unhealthy states of the gum, with teeth lengthened and in part loosened, much good will be effected by brushing and scarification ; and temporary improvement obtained by the use of artificial teeth, without extraction ; but no absolute permanent comfort must be looked for in a mouth that is changing as rapidly as these mouths always do. The dentist's opinion should be asked before anything is done, except a course of thorough cleaning ; this will let free some of the stagnant blood in the congested mucous membrane, and materially improve the state of things, and the loss of the remaining teeth will in time, if not at once, cure the evil.

The utility of artificial teeth depends on many points, but, in the present improved state of the art, all these points are under control. First, the mouth, as above observed, must be healthy enough to bear the pressure of a well fitting foreign body during mastication ; and it is secondly,. therefore, as essential that the teeth should be made to fit well to the healthy gum, but it is also requisite that they should be of the right circumference and height; again, it is requisite that only those parts of the mouth should be subjected to pressure which are able to bear it ; one of the most common sources of failure is pressure on the frenum of the tongue or the folds of mucous membrane connecting the gum and cheek, or on the sublingual gland. What can be easier than for the surgeon to detect faults so palpable when his attention is once called to observe them, and how unnecessary that such faults should exist ? The sharpness of the edges of the false structure is a common but equally unnecessary source of discomfort, and this is often caused by what at first sight looks like a misnomer—too close a fit. The base of the artificial teeth resting on the mouth should assume a shape which, under any natural motion of the jaws, will not cause pain. This is not found to be a shape which absolutely resembles the surface on which it rests, as, in that case, to entail comfort and retain the fit, there must be no motion of the false upon the natural surface, and that is impossible in almost all cases ; the gum is more or less soft, the gold or Vulcanite always quite hard and unyielding ; if the fitting of the two when at rest be absolutely perfect, it follows, that the least movement will throw the force on to a part that does not fit; none but two perfectly flat surfaces could fit at all if moved in the slightest degree upon each other. The fit required, therefore, must either be obtained whilst the artificial teeth are in use, by the gums becoming altered in shape from the constant pressure exerted by the apparatus, and so gradually adapted to it, or by having a structure formed by the dentist that is comfortable at once, in other words, has its fit so modified that under any motion of the jaws no pain or inconvenience can result. The introduction of gutta-percha as a base has rendered this matter so easily accomplished that comfort may be insured.

Next, nature makes the two jaws meet each other at a point when the muscles of mastication are in full force. We all know that there is a point of tension in every muscular structure at which the full force of its contractility is brought into operation, and that either above or below this point some of the strength is lost. So in the muscles of mastication, when the grinding surfaces of the natural teeth are in close contact with their fellows of the other jaw, the temporal and masseter muscles are at a point of tension just ready to exert their full power, which is then expended on the morsel of food placed between the teeth and this is then easily divided; but if the teeth were too short, and allowed the jaws to close beyond the right point, or too long and prevented the muscular fibres from acting in the right line, the food could not be so perfectly or easily divided, and this does sometimes happen with the natural denture; the result is partial mastication and imperfect digestion. The right point is difficult to attain artificially, but it can be done.

Then, again, it is evident that flour could not be ground between millstones that did not touch, and it would be very imperfectly and slowly done if they did not touch evenly over a large surface; so in nature's grinding-mill, the stones or teeth of the opposing jaws are made to fit each other, and a perfect cutting, dividing, and trituration of the food takes place, and this again can be achieved by the artificial grindstones provided by the dentist. Nature makes the teeth of the upper and lower jaws *inter-lock*, that is, projection of the one set fit into corresponding hollows in the other set; but this in artificial teeth is not advisable, except in a very partial degree, as they have not the great advantage possessed by their predecessors of being fixed into sockets, and thereby rendered firm enough to withstand so much lateral pressure without being displaced; nevertheless, a perfect grinding, dividing, and cutting power can be got to convert the food into proper consistency to fit it for the next stage of digestion in the stomach.

This brings us to a point of the greatest importance, several times referred to but not hitherto discussed—the fixing of the teeth. This must be as firm as possible, but not so as to give pain, or injure the remaining teeth or the soft parts around. How this is to be done depends on the state of the mouth, what teeth remain, in what state they are, and how placed ; and here great skill is required. Perfect firmness cannot be got safely when natural teeth are yet remaining in the mouth, because it would be all obtained by holding to them ; and as their roots would form the only connection with the jaw, of course all the force of mastication would fall entirely on them in an unnatural direction, and soon result in their removal. But perfect firmness is not necessary or even desirable if the base be so shaped that pressure with slight motion does not cause pain or discomfort; and as the new teeth do their duty independently of their natural neighbours, mutual support is the consequence. When the expression "firmness" is made use of in reference to the fixing of artificial teeth, immobility is not implied. This, if attained, would be termed tightness by the patient, and be an evil. We should try to obtain a medium result, and then the amount of motion of the plate on the gums necessarily implied will not be felt by the wearer, unless the fitting of the two surfaces be too perfect, or what is very common, too perfect at the edges without being solid in the centre. The motion of the jaws of man in mastication is from side to side, not directly upwards and downwards as in the carnivora, and this lateral motion brings the pressure first and strongest on the outer cusps of the grinding teeth ; the latter, artificially placed, not being absolutely firm, move under the pressure, and the edge of the base is forced unequally on to the gum, often with sufficient power to cut the surface, or by repeated attempts at mastication to produce ulceration, or in extreme cases, sloughing of portions of mucous membrane. This should be immediately detected by the medical man, and the structure causing it ordered to be altered or be condemned. Want of strength in the base would also lead to these evils, by allowing one side of the piece to move even when the other is fixed unnaturally tight to the teeth remaining on that side of the mouth. In edentulous mouths, firmness of the piece in use entirely depends on the skill employed in construction. Spiral springs of gold are placed one on either side of the mouth, external to the molar teeth, one end of the spring being attached to either of the sets (that is upper and lower), the springs are bent backwards when the mouth is closed, and press the artificial teeth upwards and downwards against the gums. How is it possible even to suppose perfect firmness and immobility under such circumstances? If springs were not used, and each set could retain its position, by suction, the motion would be only as much as the softness of the mucous membrane allowed, but this cannot always be attained, and it will at once be evident that the force of the springs if not exactly adjusted, may increase the evil they are intended to remove; the springs may be too long, and press against the structures covering the ascending ramus of the lower jaw or malar process of the superior maxilla; they may be too short, and cause the upper teeth to move when the mouth is wide open; they may be thrown outwards at the back against the cheek interfering with the parotid duct, which will come in contact with them when the Buccinator is in action; one duty of this muscle is to keep the food between the grinding surfaces of the teeth during the process of mastication, and not being able to discriminate between a spiral spring of gold and a portion of maccaroni, its pressure inwards would cause injury to the cheek. All these points again will be quite palpable to the medical practitioner now they are pointed out to him; and although they have been the cause of discomfort to many, they are now by no means necessary evils, and should never be found. Improvement in speech and appearance is specially obtained by the use of good artificial teeth, but in these matters the patients, or their non-medical friends, are well able to judge for themselves.

Having endeavoured to point out a few of the most common sources of disappointment, for the purpose of showing the small amount of knowledge requisite to discriminate between good and good for nothing in this matter, it must at once be observed that no properly qualified dental practitioner is likely to fall into these errors. The construction of artificial teeth is now well understood, and practised so largely, that they may be and ought to be as commonly and confidently ordered in cases of indigestion as splints for a broken limb.

The patient's good, as before observed, is the doctor's constant thought. but in this instance, probably from a fear of failure, he leaves the matter in the hands of his patient, who is by no means able to judge how far the object sought has been obtained, and often thinks far more of the appearance than the utility, allows all the masticating power to be lost, in order to render the things bearable to the mouth, or even takes them out to eat ; it would be a disgrace to the dental art if now, after the lapse of 100 years, such things were necessary. Such, however, is not the case, and it is time it should be well known. Nothing can be easier than for the sufferer, through the medical profession, in all parts of England, to insure obtaining this great boon,—the power of masticating his food. In all large towns there are dentists quite able to afford this comfort, and, as is well known, it is done very constantly ; but there are sources of misunderstanding existing that would vanish if the medical man better understood what should be expected, and if the dentist was asked, at the first interview, a few simple questions, which he would most willingly answer; as thus:—"What can be done in this case to improve the power of mastication? What will be the probable amount of good, and how will it be obtained? What will be the fee for the entire operation? What materials shall you employ, and what will be a fair estimate of durability? What reparation can be effected, in case of accident, to the artificial structures of the remaining teeth?"—To which questions he will give a clear and definite answer, and will doubtless do all he promises: these mechanical matters are not like treating disease. There are very few contingencies that cannot be foreseen, and arranged for; very few constitutional peculiarities likely to interfere. Now and then patients obstinately refuse to undergo the necessary extraction of loose teeth, or stumps, but they must be told plainly that such obstinacy is likely to militate against their ultimate comfort; and if this prove unavailing, the case must be declined. Whatever is possible can be seen beforehand, and what is not should not be undertaken. An operation in surgery may or may not prove successful, but in mechanical dentistry it is, and should be, as certain as that a builder can build a house, or a carpenter make a door, if he has the skill.

There are different qualities of dental work;

the poor must have cheap bread, but it need not be bad: skilled labour must be paid for, and none but the highest mechanical talent will produce good dental work, therefore it is at all times costly, but its durability is wonderful. I believe, if the highest paid London practitioner would take an ordinary patient, for whom he has made artificial teeth for ten years, he would find they had not cost his patient more than two or three pounds per annum, including all repairs; and this supposes a large fee in the first instance; for the poorer patient much less annual amount would suffice. The entire cost can be certainly told by the dentist, within small limits, at the first visit, and should be always ascertained. The quack makes his fortune out of those who do not ask beforehand what a thing is to cost: "Doctor, what is your fee? I am not rich, but I wish to avail myself of your great reputation and known skill." Does this question offend the great physician or surgeon? No. Then why should it not be constantly asked of the mechanical dentist. The fee should be understood to include all necessary preliminary and post-factum operations.

Again, a great source of failure is hurry. The patient often seems to think that he is going to throw away his money, for he comes to the dentist at four o'clock in the afternoon, and supposes an entire set, for which he is to pay twenty or thirty guineas, can be provided, and fitted perfect for use, without any alteration, by twelve o'clock the next day. The mind that can suppose such a thing practicable, must either think they are kept ready made, like shoes, or that he is to be charged a large amount of money for what would take a very short time to make. Some people even request the whole to be done whilst they wait. It is time such notions were exploded ; it is quite wonderful how they arose ; probably from the quack finding he could get his money by promising a miracle, and doing his best to perform one. Stop-gaps, in cases of sudden loss, can be arranged extemporarily, but fine, useful, permanent aids to mastication, must be produced slowly, scientifically,—certainly not hap-hazard. Dentistry is now reduced to a science, and its ends must be attained by slow but certain steps. If time is precious to the patient, let him go home and wait till the dentist lets him know the teeth are prepared, after which he can go, at his convenience, to have them fitted ; but to hurry is to cause his own disappointment.

In conclusion, it must be urged that artificial teeth, to be useful, must be well adapted to the particular mouth for which they are intended ; neither too long nor too short, too wide or too narrow ; not covering parts of the mouth where pressure is unbearable, nor fixed so tightly as to injure the remaining teeth, or cause pain ; nor fitted so close that no motion can take place during mastication, without throwing the edges down unbearably on to the soft parts beneath; nor with spiral springs thrown out against the cheeks, to fret and eventually ulcerate their lining membrane; but of a form that will allow all the natural movements of the jaws with perfect freedom and comfort, and the full power of the muscles of mastication, without giving pain; with the antagonising surfaces of the teeth so adapted to each other that they regain the power of dividing the food without being displaced to an extent sufficient to militate against their usefulness, and strong enough to bear any amount of force capable of being exerted, without in the least altering their shape or breaking. And that these points can be obtained without subjecting the patient to any preliminary pain or discomfort, beyond that requisite to prepare the mouth for using such substitutes. To arrive at this conclusion it is necessary that the medical practitioner should understand these things as well as he does splints or bandages, and that his patient should never leave the house of the dentist with new artificial teeth that are causing the least pain. Any pain or soreness caused to the mouth shows a defect in the construction of the teeth, quite unnecessary, highly detrimental, and to which the patient should not submit. The dentist can as easily cut his teeth as permit them to cut the mouth of his patient. That plenty of time should be given for their construction, and a fair price paid. The medical man can as well, and perhaps better, prepare the mouth, the simple requirement being that it must be as healthy as possible, and as many of the remaining teeth preserved as is compatible with this end; and that he should watch the case with the view of insuring again that masticating power he knows to be indispensable, and thus keep the mouth of his patient ready at all times to take its important share in the vital process of digestion.

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